Claims

We claim:

1. A multielectrode array for receiving voltage signals from neurons, the multielectrode array comprising:
   A substrate;
   At least two receiving electrodes partially contained in said substrate, each of said at least two receiving electrodes having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier; and
   An electrical insulator covering at least a portion of each of the at least two receiving electrodes.
2. The multielectrode array as in Claim 1, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.
3. A multielectrode array for receiving voltage signals from neurons, the multielectrode array comprising:
   A substrate;

At least two receiving electrodes partially contained in said substrate, each of said at least two receiving electrodes having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier, and said at least two receiving electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns; and

An electrical insulator covering at least a portion of each of the at least two receiving electrodes.

4. The multielectrode array as in Claim 3, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

5. A multielectrode array for receiving voltage signals from neurons, the multielectrode array comprising:

A substrate;

At least two receiving electrodes partially contained in said substrate, each of said at least two receiving electrodes having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier, and said at least two receiving electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns; and

An electrical insulator covering at least a portion of each of the at least two receiving electrodes.

6. The multielectrode array as in Claim 5, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently

selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

7. A multielectrode array for receiving voltage signals from neurons, the multielectrode array comprising:

A substrate;

At least two receiving electrodes partially contained in said substrate, each of said at least two receiving electrodes having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier; and

An electrical insulator covering at least a portion of each of the at least two receiving electrodes.

8. The multielectrode array as in Claim 7, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

9. A multielectrode array for receiving voltage signals from neurons, the multielectrode array comprising:

A substrate;

At least two receiving electrodes partially contained in said substrate, each of said at least two receiving electrodes having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier, and said at least two receiving electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 20 microns; and

An electrical insulator covering at least a portion of each of the at least two receiving electrodes.

10. The multielectrode array as in Claim 9, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected

from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

11. A multielectrode array for receiving voltage signals from neurons, the multielectrode array comprising:

A substrate;

At least two receiving electrodes partially contained in said substrate, each of said at least two receiving electrodes having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier, and said at least two receiving electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 45 microns; and

An electrical insulator covering at least a portion of each of the at least two receiving electrodes.

12. The multielectrode array as in Claim 11, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

13. A multielectrode array for stimulating neurons with voltage signals, the multielectrode array comprising:

A substrate;

At least two stimulating electrodes partially contained in said substrate, each of said at least two stimulating electrodes having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator; and

An electrical insulator covering at least a portion of each of the at least two stimulating electrodes.

14. The multielectrode array as in Claim 13, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

15. A multielectrode array for stimulating neurons with voltage signals, the multielectrode array comprising:

A substrate;

At least two stimulating electrodes partially contained in said substrate, each of said at least two stimulating electrodes having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator, and said at least two stimulating electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns; and

An electrical insulator covering at least a portion of each of the at least two stimulating electrodes.

16. The multielectrode array as in Claim 15, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

17. A multielectrode array for stimulating neurons with voltage signals, the multielectrode array comprising:

A substrate;

At least two stimulating electrodes partially contained in said substrate, each of said at least two stimulating electrodes having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator, and said at least two

stimulating electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns; and

An electrical insulator covering at least a portion of each of the at least two stimulating electrodes.

18. The multielectrode array as in Claim 17, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

19. A multielectrode array for stimulating neurons with voltage signals, the multielectrode array comprising:

A substrate;

At least two stimulating electrodes partially contained in said substrate, each of said at least two stimulating electrodes having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator; and

An electrical insulator covering at least a portion of each of the at least two stimulating electrodes.

20. The multielectrode array as in Claim 19, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

21. A multielectrode array for stimulating neurons with voltage signals, the multielectrode array comprising:

A substrate;

At least two stimulating electrodes partially contained in said substrate, each of said at least two stimulating electrodes having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator, and said

at least two stimulating electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 20 microns; and

An electrical insulator covering at least a portion of each of the at least two stimulating electrodes.

22. The multielectrode array as in Claim 21, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

23. A multielectrode array for stimulating neurons with voltage signals, the multielectrode array comprising:

A substrate;

At least two stimulating electrodes partially contained in said substrate, each of said at least two stimulating electrodes having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator, and said at least two stimulating electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 45 microns; and

An electrical insulator covering at least a portion of each of the at least two stimulating electrodes.

24. The multielectrode array as in Claim 23, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

25. A multielectrode array for receiving voltage from neurons and stimulating neurons with voltage signals, the array comprising:

A substrate;

At least one receiving electrode partially contained in said substrate, each said at least one receiving electrode having a carbon fiber with an exposed end extending

beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier;

At least one stimulating electrode partially contained in said substrate, each said at least one stimulating electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator; and

An electrical insulator covering at least a portion of the said at least one receiving electrode and the said at least one stimulating electrode.

26. The multielectrode array as in Claim 25, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

27. A multielectrode array for receiving voltage from neurons and stimulating neurons with voltage signals, the array comprising:

A substrate;

At least one receiving electrode partially contained in said substrate, each said at least one receiving electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns;

At least one stimulating electrode partially contained in said substrate, each said at least one stimulating electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a

center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns; and

An electrical insulator covering at least a portion of the said at least one receiving electrode and the said at least one stimulating electrode.

28. The multielectrode array as in Claim 27, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

29. A multielectrode array for receiving voltage from neurons and stimulating neurons with voltage signals, the array comprising:

A substrate;

At least one receiving electrode partially contained in said substrate, each said at least one receiving electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns;

At least one stimulating electrode partially contained in said substrate, each said at least one stimulating electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so

that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns; and

An electrical insulator covering at least a portion of the said at least one receiving electrode and the said at least one stimulating electrode.

30. The multielectrode array as in Claim 29, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

31. A multielectrode array for stimulating neurons with voltage signals and for receiving voltage signals from neurons, the multielectrode array comprising:

A substrate;

At least one stimulating electrode partially contained in said substrate, each at least one stimulating electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator;

At least one receiving electrode partially contained in said substrate, each at least one receiving electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier;

and

An electrical insulator covering at least a portion of the said at least one receiving electrode and the said at least one stimulating electrode.

32. The multielectrode array as in Claim 31, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

33. A multielectrode array for stimulating neurons with voltage signals and for receiving voltage signals from neurons, the multielectrode array comprising:

A substrate;

At least one stimulating electrode partially contained in said substrate, each at least one stimulating electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns;

At least one receiving electrode partially contained in said substrate, each at least one receiving electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns;

and

An electrical insulator covering at least a portion of the said at least one receiving electrode and the said at least one stimulating electrode.

34. The multielectrode array as in Claim 33, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

35. A multielectrode array for stimulating neurons with voltage signals and for receiving voltage signals from neurons, the multielectrode array comprising:

A substrate;

At least one stimulating electrode partially contained in said substrate, each at least one stimulating electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator, and said receiving

electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns;

At least one receiving electrode partially contained in said substrate, each at least one receiving electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns;

and

An electrical insulator covering at least a portion of the said at least one receiving electrode and the said at least one stimulating electrode.

36. The multielectrode array as in Claim 35, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

37. A multielectrode array for receiving voltage from neurons, stimulating neurons with voltage signals, and for providing feed-back between neurons, the array comprising:

Said substrate;

At least one receiving electrode partially contained in said substrate, each said at least one receiving electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier;

At least one stimulating electrode partially contained in said substrate, each said at least one stimulating electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a

center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator;

At least one feedback loop constituting a system partially contained in said substrate, containing a first carbon fiber with an exposed end capable of being embedded in neural tissue, said first carbon fiber's unexposed end coupled to a first metal wire's first end, said first metal wire's second end coupled to the input to a pre-amplifier, the output of said pre-amplifier coupled to the input to a band-pass amplifier, the output from said band-pass amplifier coupled to the input to an output limiter, the output of said output limiter coupled to a current generator, said current generator coupled to the said second end of a second metal wire and also to a current supply, the said first end of said second metal wire coupled to the unexposed end of a second carbon fiber; the said exposed end of said second carbon fiber capable of being embedded in neural tissue; and

Said electrical insulator for each of the said at least one receiving electrode, said at least one stimulating electrode, and said at least one feedback loop.

38. The multielectrode array as in Claim 37, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

39. The multielectrode array as in Claim 37, where the output limiter is deleted.

40. A multielectrode array for receiving voltage from neurons, stimulating neurons with voltage signals, and for providing feed-back between neurons, the array comprising:

Said substrate;

At least one receiving electrode partially contained in said substrate, each said at least one receiving electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier, and said receiving electrode being

spaced from any receiving electrode, stimulating electrode or feedback loop so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns;

At least one stimulating electrode partially contained in said substrate, each said at least one stimulating electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator, and said stimulating electrode being spaced from any receiving electrode, stimulating electrode or feedback loop so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns;

At least one feedback loop constituting a system partially contained in said substrate, containing a first carbon fiber with an exposed end capable of being embedded in neural tissue, said first carbon fiber's unexposed end coupled to a first metal wire's first end, said first metal wire's second end coupled to the input to a pre-amplifier, the output of said pre-amplifier coupled to the input to a band-pass amplifier, the output from said band-pass amplifier coupled to the input to an output limiter, the output of said output limiter coupled to a current generator, said current generator coupled to the said second end of a second metal wire and also to a current supply, the said first end of said second metal wire coupled to the unexposed end of a second carbon fiber; the said exposed end of said second carbon fiber capable of being embedded in neural tissue, and said feedback loop being spaced from any receiving electrode, stimulating electrode or other feedback loop so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns; and

Said electrical insulator for each of the said at least one receiving electrode, said at least one stimulating electrode, and said at least one feedback loop.

41. The multielectrode array as in Claim 40, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently

selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

42. The multielectrode array as in Claim 40, where the output limiter is deleted.

43. A multielectrode array for receiving voltage from neurons, stimulating neurons with voltage signals, and for providing feed-back between neurons, the array comprising:

Said substrate;

At least one receiving electrode partially contained in said substrate, each said at least one receiving electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a pre-amplifier, and said receiving electrode being spaced from any receiving electrode, stimulating electrode or feedback loop so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns;

At least one stimulating electrode partially contained in said substrate, each said at least one stimulating electrode having a carbon fiber with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue, said carbon fiber's unexposed end coupled to a metal wire's first end, said metal wire's second end being coupled to the input to a current generator, and said stimulating electrode being spaced from any receiving electrode, stimulating electrode or feedback loop so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns;

At least one feedback loop constituting a system partially contained in said substrate, containing a first carbon fiber with an exposed end capable of being embedded in neural tissue, said first carbon fiber's unexposed end coupled to a first metal wire's first end, said first metal wire's second end coupled to the input to a pre-amplifier, the output of said pre-amplifier coupled to the input to a band-pass amplifier, the output from said band-pass amplifier coupled to the input to an

output limiter, the output of said output limiter coupled to a current generator, said current generator coupled to the said second end of a second metal wire and also to a current supply, the said first end of said second metal wire coupled to the unexposed end of a second carbon fiber; the said exposed end of said second carbon fiber capable of being embedded in neural tissue, and said feedback loop being spaced from any receiving electrode, stimulating electrode or other feedback loop so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns; and

Said electrical insulator for each of the said at least one receiving electrode, said at least one stimulating electrode, and said at least one feedback loop.

44. The multielectrode array as in Claim 43, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

45. The multielectrode array as in Claim 43, where the output limiter is deleted.

46. A multielectrode array for stimulating neurons with voltage signals and for receiving voltage signals from neurons, and for providing feed-back between neurons, the multielectrode array comprising:

A substrate;

At least one stimulating electrode partially contained in said substrate, each at least one stimulating electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator;

At least one receiving electrode partially contained in said substrate, each at least one receiving electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier;

At least one feedback loop constituting a system partially contained in said substrate, containing a first biocompatible wire with an exposed end extending

beyond the substrate, an unexposed end within the substrate, and a center, said first biocompatible wire's unexposed end coupled to the input to a pre-amplifier, the output of said pre-amplifier coupled to the input to a band-pass amplifier, the output from said band-pass amplifier coupled to the input to an output limiter, the output of said output limiter coupled to a current generator, said current generator coupled to the second end of a second biocompatible wire and also to a current supply, the said first end of said second biocompatible wire capable of being embedded in neural tissue; and

Said electrical insulator for each of the said at least one receiving electrode, said at least one stimulating electrode, and said at least one feedback loop.

and

An electrical insulator covering at least a portion of the said at least one receiving electrode and the said at least one stimulating electrode.

47. The multielectrode array as in Claim 46, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

48. The multielectrode array as in Claim 46, where the output limiter is deleted.

49. A multielectrode array for stimulating neurons with voltage signals and for receiving voltage signals from neurons, and for providing feed-back between neurons, the multielectrode array comprising:

A substrate;

At least one stimulating electrode partially contained in said substrate, each at least one stimulating electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator, and said stimulating electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 20 microns;

At least one receiving electrode partially contained in said substrate, each at least one receiving electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 20 microns;

At least one feedback loop constituting a system partially contained in said substrate, containing a first biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said first biocompatible wire's unexposed end coupled to the input to a pre-amplifier, the output of said pre-amplifier coupled to the input to a band-pass amplifier, the output from said band-pass amplifier coupled to the input to an output limiter, the output of said output limiter coupled to a current generator, said current generator coupled to the second end of a second biocompatible wire and also to a current supply, the said first end of said second biocompatible wire capable of being embedded in neural tissue, and said feedback loop being spaced from any receiving electrode, stimulating electrode or other feedback loop so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 20 microns;

and

Said electrical insulator for each of the said at least one receiving electrode, said at least one stimulating electrode, and said at least one feedback loop.

and

An electrical insulator covering at least a portion of the said at least one receiving electrode and the said at least one stimulating electrode.

50. The multielectrode array as in Claim 49, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

51. The multielectrode array as in Claim 49, where the output limiter is deleted.

52. A multielectrode array for stimulating neurons with voltage signals and for receiving voltage signals from neurons, and for providing feed-back between neurons, the multielectrode array comprising:

A substrate;

At least one stimulating electrode partially contained in said substrate, each at least one stimulating electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a current generator, and said stimulating electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 45 microns;

At least one receiving electrode partially contained in said substrate, each at least one receiving electrode having a biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said exposed end capable of being embedded in neural tissue and said unexposed end coupled to the input to a pre-amplifier, and said receiving electrode being spaced from any receiving electrode or stimulating electrode so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 45 microns;

At least one feedback loop constituting a system partially contained in said substrate, containing a first biocompatible wire with an exposed end extending beyond the substrate, an unexposed end within the substrate, and a center, said first biocompatible wire's unexposed end coupled to the input to a pre-amplifier, the output of said pre-amplifier coupled to the input to a band-pass amplifier, the output from said band-pass amplifier coupled to the input to an output limiter, the output of said output limiter coupled to a current generator, said current generator coupled to the second end of a second biocompatible wire and also to a current supply, the said first end of said second biocompatible wire capable of being embedded in neural tissue, and said feedback loop being spaced from any

receiving electrode, stimulating electrode or other feedback loop so that the spacing between the centers of said exposed ends of each said biocompatible wire does not exceed 45 microns; and

Said electrical insulator for each of the said at least one receiving electrode, said at least one stimulating electrode, and said at least one feedback loop.

53. The multielectrode array as in Claim 52, where each of said biocompatible wires has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

54. The multielectrode array as in Claim 52, where the output limiter is deleted.

55. A biosensing device, comprising:

A substrate;

At least two biosensing electrode circuits, each said at least two biosensing electrode circuit containing a biosensing electrode having a carbon fiber with an exposed end extending beyond the substrate, an exposed end within the substrate, and a center, said carbon fiber being coupled with the first end of a metal wire, said metal wire's second end being coupled with an amperometry device, said amperometry device being coupled with a voltage source and a pre-amplifier, said voltage source being coupled with a reference wire; and

An electrical insulator covering at least a portion of each of the biosensing electrodes and the reference wire.

56. The biosensing device as in Claim 55, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

57. A biosensing device, comprising:

A substrate;

At least two bioensing electrode circuits, each said at least two biosensing electrode circuits containing a sensing electrode having a carbon fiber with an exposed end extending beyond the substrate, an exposed end within the substrate, and a center, said carbon fiber being coupled with the first end of a metal wire,

said metal wire's second end being coupled with an amperometry device, said amperometry device being coupled with a voltage source and a pre-amplifier, said voltage source being coupled with a reference wire, and said at least two biosensing electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns; and

An electrical insulator covering at least a portion of each of the biosensing electrodes and the reference wire.

58. The biosensing device as in Claim 57, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

59. A biosensing device, comprising:

A substrate;

At least two bioensing electrode circuits, each said at least two biosensing electrode circuits containing a sensing electrode having a carbon fiber with an exposed end extending beyond the substrate, an exposed end within the substrate, and a center, said carbon fiber being coupled with the first end of a metal wire, said metal wire's second end being coupled with an amperometry device, said amperometry device being coupled with a voltage source and a pre-amplifier, said voltage source being coupled with a reference wire, and said at least two biosensing electrode being spaced from one another so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns; and

An electrical insulator covering at least a portion of each of the biosensing electrodes and the reference wire.

60. The biosensing device as in Claim 59, where each of said at least two carbon fibers has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

61. A biosensing device, comprising:

A substrate;

At least two biosensing electrode circuits, each of said at least two biosensing electrode circuits containing a biosensing electrode having a biocompatible wire with an exposed end extending beyond the substrate, an exposed end within the substrate, and a center, said biocompatible wire being coupled with an amperometry device, said amperometry device being coupled with a voltage source and a pre-amplifier, said voltage source being coupled with a reference wire, and said at least two biosensing electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 20 microns; and

An electrical insulator covering at least a portion of each of the biosensing electrodes and the reference wire.

62. The biosensing device as in Claim 61, where said biocompatible wire has any combination of at least one of the characteristics independently selected from the group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

63. A biosensing device, comprising:

A substrate;

At least two biosensing electrode circuits, each of said at least two biosensing electrode circuits containing a biosensing electrode having a biocompatible wire with an exposed end extending beyond the substrate, an exposed end within the substrate, and a center, said biocompatible wire being coupled with an amperometry device, said amperometry device being coupled with a voltage source and a pre-amplifier, said voltage source being coupled with a reference wire, and said at least two biosensing electrodes being spaced from one another so that the spacing between the centers of said exposed ends of each said carbon fiber does not exceed 45 microns; and

An electrical insulator covering at least a portion of each of the biosensing electrodes and the reference wire.

64. The biosensing device as in Claim 63, where said biocompatible wire has any combination of at least one of the characteristics independently selected from the

group consisting of: a coating on the exposed end, a sharpened tip, and varied length of the exposed end.

65. A system for acquiring voltage signals from neurons, comprising:

A receiving electrode for receiving a voltage signal input from neurons, said receiving electrode being coupled to said pre-amplifer;

Said pre-amplifier coupled to said band-pass amplifier;

Said band-pass amplifier coupled to an output limiter;

Said output limiter coupled to said current generator; and

Said current generator coupled to said stimulating electrode.